Paralana Geothermal Energy Project

Community Consultation Meetings – Questions and Answers

The following questions were raised at recent community consultation meetings held at Hawker, Leigh Creek and Arkaroola. This list will be regularly updated.

Further information can also be found at www.petratherm.com.au and related websites.

1. What are 'hot rocks'?

Geothermal heat comes from the Earth's early formation more than four billion years ago and from the natural radiogenic decay of minerals such as thorium, uranium and potassium. This continually generated heat is known as geothermal heat.

In some areas, where high temperatures come close enough to the surface, we can tap into the heat to produce electricity. This energy is environmentally friendly, produces no greenhouse emissions and is renewable.

In Australia, locations with high temperatures at depth are due to anomalously high radiogenic decay within the shallow earth's crust - not from magma sources.

In order to retain the heat, these high heat producing rocks need to be insulated by being buried typically under 3km to 4km of younger sedimentary rock which act as a thermal blanket. Typical temperatures can range between 150 and 250 degrees Celsius at depths of approximately 3km to 5km below the Earth's surface.

The term "hot rocks" typically refers to this form of geothermal system. As these systems are often dry and lack fluid pathways in which to circulate fluid through, they are termed "Engineered Geothermal Systems" (sometimes referred to as hot dry rock or hot rock). This is because in order to extract heat energy from the rock, a fluid circulation path needs to be engineered through the rock to allow heat extraction.

2. How is the fracturing process controlled? Will it trigger an earthquake?

Facturing is a controlled part of the process of constructing a fluid path through an Engineered Geothermal System (EGS). The fracturing process involves the injection of water under high pressure into the surrounding rock at the proposed reservoir depth. The high pressure fluid opens up pre-existing hairline fractures within the rock. When the rock fractures, a small amount of slip occurs along the fracture line. Once pumping of the fluid ceases, the fracture will remain open as both pieces of rock are not perfectly aligned. Each fracture produces a micro-seismic event.

During the course of the fracturing process, which may take several weeks, many thousands of tiny fractures are opened within the rock. Each micro-seismic event is too small to be felt by humans on the surface. In very rare instances, a slightly larger seismic event may occur, which could possibly be felt within the immediate vicinity of the well. The seismic activity is continually monitored at sites surrounding the project area.

3. Is the radioactivity in the rocks dangerous?

The type of unique fluid circulating unit ï the HEWI model - being used by Petratherm at the Paralana site will only circulate water through the covering top layers of sedimentary rock, not through the deeper, radiogenically enriched rocks where naturally occurring levels of uranium and thorium are present.

Whilst the heat being generated in these deeper rocks is from natural radiogenic decay the actual concentrations of these elements is still very small. A high heat production rock typically contains about 20 parts per million uranium and 40 parts per million thorium. These concentrations are about six times higher than deposits contained in normal rocks but are still many times lower than the World Health Organisationôs safety standards.

The reason these rocks produce so much extra heat is largely due to their size - they typically occur in granite bodies that may be several kilometres thick and tens of kilometres long and wide. The circulation of fluids through radiogenically enriched rocks does not to dissolve any of the radiogenic minerals contained in the rock, so the working fluid for the geothermal plants using this approach is safe.

4. How much water will the project use and where will this water come from?

Until Petratherm begins trial circulation tests between an injection and production well it is unable to determine the required water use. It may be that the reservoir is saturated, and in that case, there would be no need for extra water. If the system is dry and water needs to be provided, the water will be sourced from the Great Artesian Basin aquifer, a prescribed water source by the South Australian Government. Petratherm would require a water allocation licence and the amount of water available would be determined after an environmental impact study and assessment of other water users in the region.

All the water produced in an engineered geothermal system is re-injected so, provided there were only minor water losses between the injection wells and production wells, water usage is unlikely to be significant.

5. Will the use of water from the Great Artesian Basin affect the mound springs in the region?

Prior to any water use a full environmental impact assessment would be undertaken to determine a safe and sustainable water allocation, ensuring the natural flows to the Mound Springs in the Region would not be affected.

6. How will you protect the Paralana hot springs from being affected by your project?

The Paralana Hot springs are supplied by a hydrological system which is not connected to the proposed Paralana reservoir site. The Paralana site is 30 kilometres away from the springs and the proposed project reservoir is contained. As an extra precaution, Petratherm will monitor the hot springs to ensure any change would be immediately detected.

7. Where will the transmission lines be built and can you bury them underground?

In the initial phase of the project, it is proposed to supply any power generated by the Paralana project to the nearby Beverley Uranium Mine, just 11 kms away. The transmission line is most likely to be a 33,000 volt line, which is a typical lower voltage pole construction line.

Over the longer term, after satisfying the power needs of the local market, a connection to either Port Augusta or Olympic Dam would be required involving a 275,000 high voltage transmission line utilizing a lattice tower construction.

The location of both the low voltage and high voltage lines is still to be determined and will involve significant consultation as required under the relevant Acts (e.g. mining, petroleum and development).

The cost of undergrounding the low voltage and high voltage lines is substantial, typically 3-4 times the cost of overhead lines and while those costs will be assessed, it is unlikely that such power lines would be underground.

8. How many jobs will the project generate and will you be employing people from the region and Aboriginal community?

The number of jobs that this project can generate is directly related to the ultimate size of the development of the Paralana Project. Should the project achieve a capacity of 260 megawatts over the next 10-15 years, then it is estimated that a total of 200 jobs could be created. Petratherm will seek to offer employment to the local community and encourage indigenous employment.

9. Is it possible to deplete geothermal sources?

The geothermal heat at the Paralana site is constantly being generated. Localised cooling of the rock through long term circulation of fluid will occur, however, once circulation stops the cooled rock will reheat to its natural temperature. Heat transfer modelling for Paralana suggests, as a rule of thumb, that the rocks will take approximately 1.5 times the circulation time to re-heat.

10. Will you be creating more greenhouse emissions through the life of the project than what the actual project will displace?

Geothermal energy is virtually free of carbon dioxide and other emissions. The equivalent of a 1000 megawatt geothermal power plant could save 20 million tonnes of Carbon Dioxide each year (3% of Australia's current greenhouse gas emissions), by replacing a coal fired power plant.

During drilling of the first few wells at Paralana, Petratherm will use diesel as the energy source. However, as the field develops, we will use the electricity produced from our geothermal resources to power the drilling rigs, pumps and facilities, reducing the overall impact of the project on the environment.

11. Why are you supplying a uranium mine in the first phase of the project and not sending the energy directly into the electricity grid?

As a large customer with a steady energy demand, the Beverley Uranium Mine provides a stable income stream that will underpin Petrathermôs efforts to build and test its initial plant and then expand the development to around 30 megawatts. This is the most economic path to commercialisation for the Paralana Project. Beyond the local market, as indicated in Q7 earlier, the power generated would be connected to the national electricity grid either at Port Augusta or Olympic Dam. The cost of each of those transmission connections is significant, at around $170 million and would require 260 MW of power generation development to be cost effective.

12. Has there been consultation and advice from the local Aboriginal communities?

Since the start of the Paralana Project, Petratherm has worked closely with the local Adynamantha Community. Petratherm and our joint venture partners ï Beach and TRUenergy Geothermal, are committed to maintaining regular dialogue. Several heritage surveys have also been conducted to ensure any ground works do not disturb any cultural sites of significance. To date, Petrathermôs operations and future plans have been received well by the local community. There is a common interest to produce zero emission power which is better for the environment and a recognition that a new development could have positive spin offs for the local community. We will continue to work with local indigenous communities as the project evolves.